

## An atlas of the Mecoptera of KwaZulu-Natal, South Africa

by

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### ABSTRACT

Eleven species of Mecoptera are known to occur in KwaZulu-Natal. A key for their identification, and maps showing their distribution within the province, are supplied and commented upon. In addition, all available data relating to adult seasonality and habitat are summarised. Although data are incomplete and offer a largely historical perspective, it is suggested that the Mecoptera, being large, easily recognised predatory insects, could prove to be useful in future conservation or biodiversity orientated initiatives.

### INTRODUCTION

There is a lack of detailed distributional information relating to southern African invertebrates. The importance of invertebrates and micro-organisms in biodiversity conservation has been recently highlighted by Ponder (1992). Inadequate invertebrate data in the recently conducted environmental impact assessment of the Eastern Shores of Lake St Lucia (CSIR Environmental Services 1993), leaves little doubt that ecologists, conservationists and biodiversity practitioners are urgently in need of the sort of input only knowledgeable taxonomists and biogeographers are able to provide. For a variety of reasons, mostly centred on the huge number of taxa involved, invertebrate specialists have been slow to respond. Insect groups which have proved useful have almost invariably been those which are best known (e.g. Lepidoptera and Odonata). In this paper I hope to demonstrate how members of the relatively poorly known order, Mecoptera, are also potentially useful.

Mecoptera are one of the smallest and yet most distinctive orders of southern African insects. Twenty nine species are known from the subregion (Londt 1994). All belong to the family Bittacidae and, except for one wingless species, *Anomalobittacus gracilis* Kimmins, 1928, from the south-western Cape, belong to the genus *Bittacus* Latreille, 1805, which, as adults, are large (about 3–4 cm wingspan), instantly recognisable insects (Fig. 1). Bittacidae are without exception predacious, mainly on other winged insects. The latest revisionary work is that of Londt (1972), and the most recently published key (Londt 1978) covers all but the most recently described species, namely *Bittacus bicornis* Londt, 1993. While there may be a few undiscovered taxa, the taxonomy of the southern African fauna is considered to be largely complete. With few exceptions the species can be identified in the field without the use of a lens.

Although distributional information is incomplete for a number of southern African species, data for the eleven species known from KwaZulu-Natal, where collecting has been most intense, are sufficiently adequate to warrant special treatment.



Fig. 1. *Bittacus nebulosus* Klug, 1838, a typical and common mecopteran of KwaZulu-Natal.

#### MATERIAL AND METHODS

Findings are based primarily on data attached to pinned and alcohol-preserved specimens housed in museums in southern African and abroad (14 in all). Data have been captured in a computerised data-base at the Natal Museum, which has by far the largest collection of Afrotropical Mecoptera. It includes 163 of the 253 KwaZulu-Natal records (i.e. groups of conspecific specimens bearing the same label data) and 398 of the 568 KwaZulu-Natal specimens studied. A second source of information is my 25 years of field-experience.

Distributions were plotted on a map of KwaZulu-Natal showing the main river systems (Fig. 2) and with the standard quarter-degree grid overlay (printed in blue ink and consequently not reproduced when printed). As the distributions of some species appear to be at least partly altitude-related, Harrison & Oatley's useful (1991) map (redrawn as Fig. 3), showing the average altitude of each of KwaZulu-Natal's quarter-degree squares, was used in analysing relationships.



Fig. 2. Standard map of KwaZulu-Natal showing main river systems and major centres.

TABLE 1

Seasonal incidence of KwaZulu-Natal *Bittacus* species.

• = KwaZulu-Natal dates; ○ = dates available for places outside KwaZulu-Natal.

Species	J	A	S	O	N	D	J	F	M	A	M	J
<i>armatus</i>	—	—	—	—	○	•	○	○	—	•	—	—
<i>bicornis</i>	—	—	—	—	—	•	—	—	—	—	—	—
<i>kimminsi</i>	—	—	•	—	•	•	•	•	•	•	—	—
<i>nebulosus</i>	—	—	—	○	•	•	•	•	○	•	—	—
<i>peringueyi</i>	○	—	—	—	—	•	•	•	•	•	○	○
<i>selysi</i>	•	—	—	•	•	•	•	•	—	—	—	—
<i>sobrinus</i>	—	—	•	—	•	•	•	—	—	—	—	—
<i>testaceus</i>	—	—	•	○	•	•	•	•	•	○	—	—
<i>walkeri</i>	—	—	—	—	—	—	•	•	•	•	•	—
<i>zambezinus</i>	—	—	—	—	—	—	•	•	•	—	—	—
<i>zulu</i>	—	—	—	•	•	•	—	—	—	•	•	—

IDENTIFICATION

Key to the *Bittacus* species of KwaZulu-Natal

[This key is based mainly on field characters not requiring illustration. Terminology is that of Londt (1972 1978 1993). Females of some species are difficult to identify without associated males. Identifications may also require confirmation by examination of male genitalia.]

- 1 Mesonotum with dark markings .....2
- Mesonotum unicolorous .....5
- 2 Wings narrow, pterostigma 5–6 times longer than wide [grassland species] .....3
- Wings broad, pterostigma *ca* 4 or fewer times longer than wide .....4
- 3 Femora with dark apices [low- to mid-altitude grassland] .....**walkeri**
- Femora lacking dark apices [high-altitude grassland] .....**kimminsi**
- 4 Pterostigma darkly pigmented; crossveins darkly shaded; abdomen distally blackish [mid-altitude forest floors and margins] .....**selysi**
- Pterostigma pale; crossveins not obviously shaded; abdomen unicolorous brown-yellow [high-altitude grassland] .....**sobrinus**

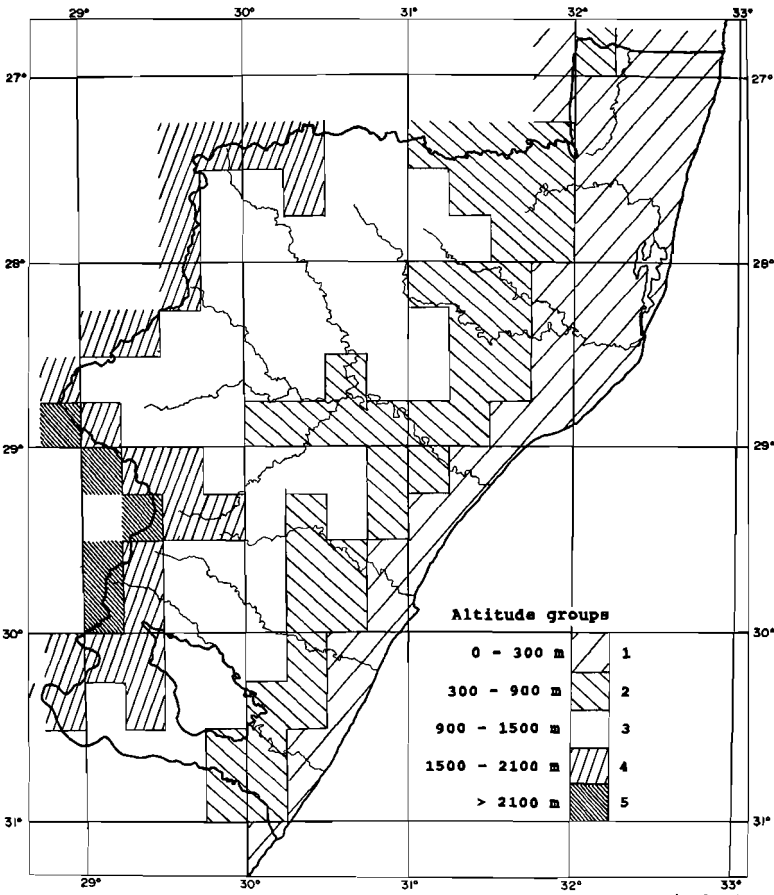


Fig. 3. Average altitude of quarter-degree grid squares (from Harrison & Oatley (1991)).

- 5 Distal half of fore femur dark red-brown, strongly contrasted with mid-leg; wing distinctly pointed at tip of  $R_5$ ; male proctiger and penisfillum highly elongate [low- to mid-altitude, commonly attracted to light] ..... **zambezinus**
- Femora of fore and mid-leg similarly coloured (brown-yellow, with or without dark apex); wing distally rounded; male proctiger and penisfillum not highly elongate ..... 6
- 6 Large species with strongly shaded wings (mostly crossveins); first anal vein ( $A_1$ ) reaches wing margin before level of first fork of radial-sector (FRs); abdomen distally blackish [low- to mid-altitude forest margins and floors or high-altitude montane riverine bush] ..... **nebulosus**
- Moderately large species with at most very weakly shaded wing (crossveins);  $A_1$  reaches wing margin beyond level of FRs; abdomen unicolorous brown-yellow 7
- 7 1 pterostigmal crossvein (i.e. crossveins posterior of pterostigma) [mid- to high-altitude, commonly attracted to light] ..... **peringueyi**
- 2 pterostigmal crossveins ..... 8
- 8 Pterostigma darkly pigmented; male epandrial lobes not greatly elongate [low- to mid-altitude tree-shaded grass] ..... **zulu**
- Pterostigma only slightly darker than general wing membrane; male epandrial lobes greatly elongate ..... 9
- 9 Femora with dark apices [mid-altitude grassland] ..... **armatus**
- Femora lacking dark apices ..... 10
- 10 Male with 2 horn-like processes at hind margin of tergum 8 [high-altitude grassland and scrub] ..... **bicornis**
- Male lacking processes on tergum 8 [mid-altitude grassland and scrub] ..... **testaceus**

TABLE 2

Altitude preferences of KwaZulu-Natal *Bittacus* species.

[Based on Harrison &amp; Oatley (1991) altitudinal categories, i.e. 1 = 0–300 m, 2 = 300–600 m,

3 = 600–900 m, 4 = 900–1200 m, 5 = &gt; 1200 m]. – = no records, ■ = 1–5 records, ■■ = 6–10 records,

■■■■ = 11–15 records, ■■■■■ = 16–20, ■■■■■■ = &gt; 21 records.

Alt	Species										
	<i>zambezinus</i>	<i>zulu</i>	<i>armatus</i>	<i>nebulosus</i>	<i>walkeri</i>	<i>selysi</i>	<i>testaceus</i>	<i>peringueyi</i>	<i>kimminsi</i>	<i>sobrinus</i>	<i>bicornis</i>
1	■	■	–	■■	■■	■	■	■	–	–	–
2	–	–	■	■■■■	■■■■	■■■	■	■	■	–	–
3	■	■	–	■■■	■■■■	■■■■	■	■	■	■	–
4	–	–	–	■■	■	–	■	■■■	■■■■	■■■	■
5	–	–	–	–	–	–	–	–	■	–	–

## SPECIES ACCOUNTS

*Bittacus armatus* Tjeder, 1956Synonyms: *Bittacus solitarius* Tjeder, 1956.

Type locality: South Africa: Transvaal: Minastune (Louis Trichardt).

Recognition: A large, broad-winged, yellowish species. Wings unmarked and with two pterostigmal crossveins; legs with dark tipped femora; male epandrial lobes elongate. Similar species: *B. bicornis*, *B. testaceus*.

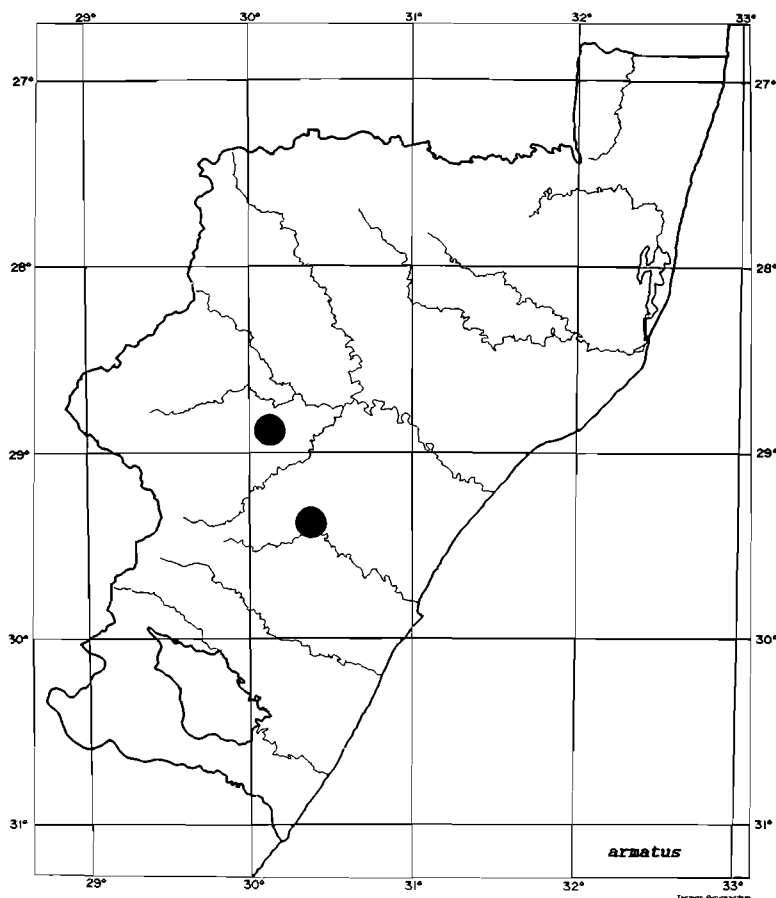


Fig. 4. *Bittacus armatus* Tjeder, 1956, distribution in KwaZulu-Natal.

Number of KwaZulu-Natal specimens studied: 4.

Afrotropical distribution: South Africa (Transvaal, KwaZulu-Natal); Zimbabwe. The bulk of records are from the Transvaal.

KwaZulu-Natal distribution (Fig. 4): Known from only two localities, both between 300–600 m asl (Table 2).

Seasonal incidence of adults: A mid to late summer species (Table 1); KwaZulu-Natal records are for December and April.

Habitat: Open grassveld with an apparent preference for long grass in low-lying areas.

#### *Bittacus bicornis* Londt, 1993

Synonyms: None.

Type locality: South Africa: KwaZulu-Natal: Monk's Cowl.

Recognition: A moderately large, broad-winged, yellowish species. Wings unmarked and with two pterostigmal crossveins; legs lacking dark tipped femora; male

epandrial lobes elongate, tergum 8 with a pair of horn-like processes. Similar species: *B. armatus*, *B. testaceus*.

Number of KwaZulu-Natal specimens studied: 1.

Afrotropical distribution: South Africa (KwaZulu-Natal).

KwaZulu-Natal distribution (Fig. 5): Known only from the type-locality of Monk's Cowl which is between 900–1200 m asl (Table 2).

Seasonal incidence of adults: Adults probably active in mid-summer. Type material collected in December (Table 1).

Habitat: Collected in long grass adjacent to a stream.

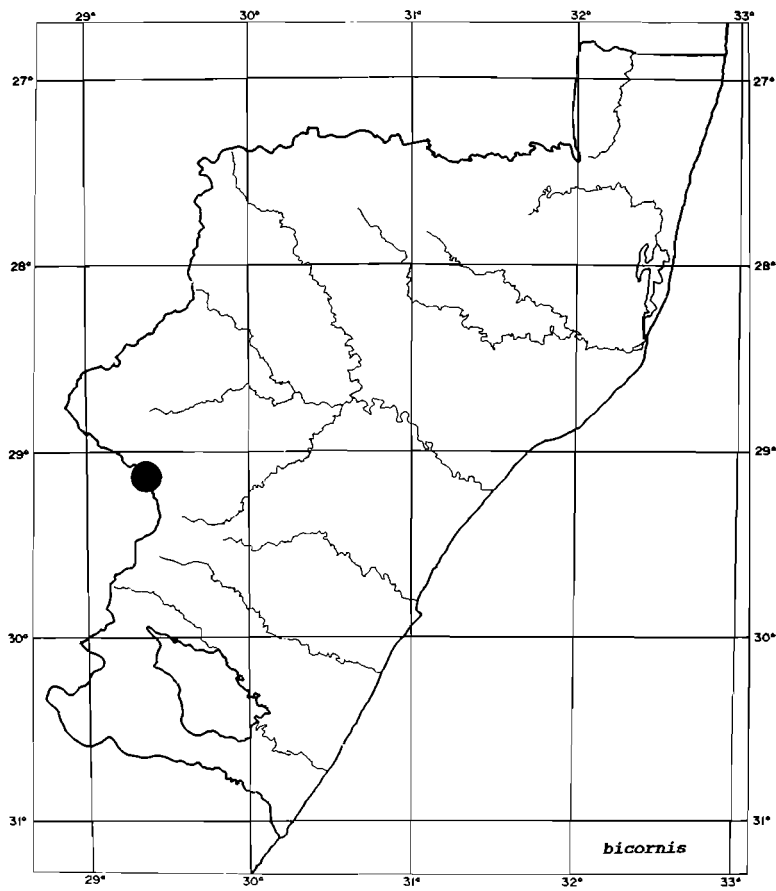


Fig. 5. *Bittacus bicornis* Londt, 1993, distribution in KwaZulu-Natal.

*Bittacus kimminsi* Tjeder, 1956

Synonyms: None.

Type locality: South Africa: KwaZulu-Natal: Royal Natal National Park.

Recognition: A large, narrow-winged, yellowish species. Wings unmarked and with two pterostigmal crossveins; legs lacking dark tipped femora; male epandrial lobes short. Similar species: *B. walkeri*.

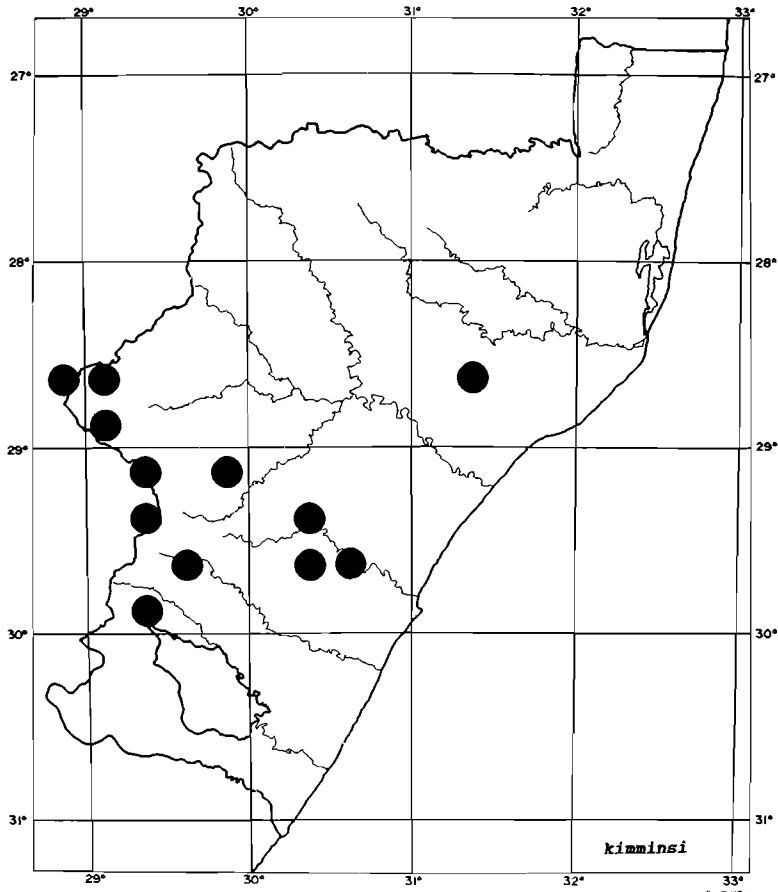


Fig. 6. *Bittacus kimminsi* Tjeder, 1956, distribution in KwaZulu-Natal.

Number of KwaZulu-Natal specimens studied: 72.

Afrotropical distribution: South Africa (KwaZulu-Natal, Orange Free State, Cape Province).

KwaZulu-Natal distribution (Fig. 6): A species of high-lying areas, the majority of specimens being collected between 900–1200 m asl in the Drakensberg mountains (Table 2).

Seasonal incidence of adults: Collected in KwaZulu-Natal between September and April (Table 1), but appears to be more common during the second half of summer.

Habitat: Montane grassland. There appears to be an association with damp areas.

*Bittacus nebulosus* Klug, 1838

Synonyms: None.

Type locality: South Africa: KwaZulu-Natal: Eshowe.

Recognition: A large, broad-winged, yellow and black species. Wing membranes strongly marked; two pterostigmal crossveins; legs with dark tipped femora;



abdomen extensively blackish; male epandrial lobes elongate. Similar species: None.

Number of KwaZulu-Natal specimens studied: 104.

Afrotropical distribution: South Africa (Transvaal, KwaZulu-Natal, Cape Province); Transkei.

KwaZulu-Natal distribution (Fig. 7): Widespread throughout the province. Found at all but the very highest altitudes, but appears to be more common at altitudes below 900 m (Table 2).

Seasonal incidence of adults: In KwaZulu-Natal is active between November and April (Table 1), but appears to be more common during mid-summer.

Habitat: Indigenous forest margins and understories. Tends to inhabit thickish undergrowth up to a height of approximately 2 m. At higher altitudes the species is found in riverine bush.

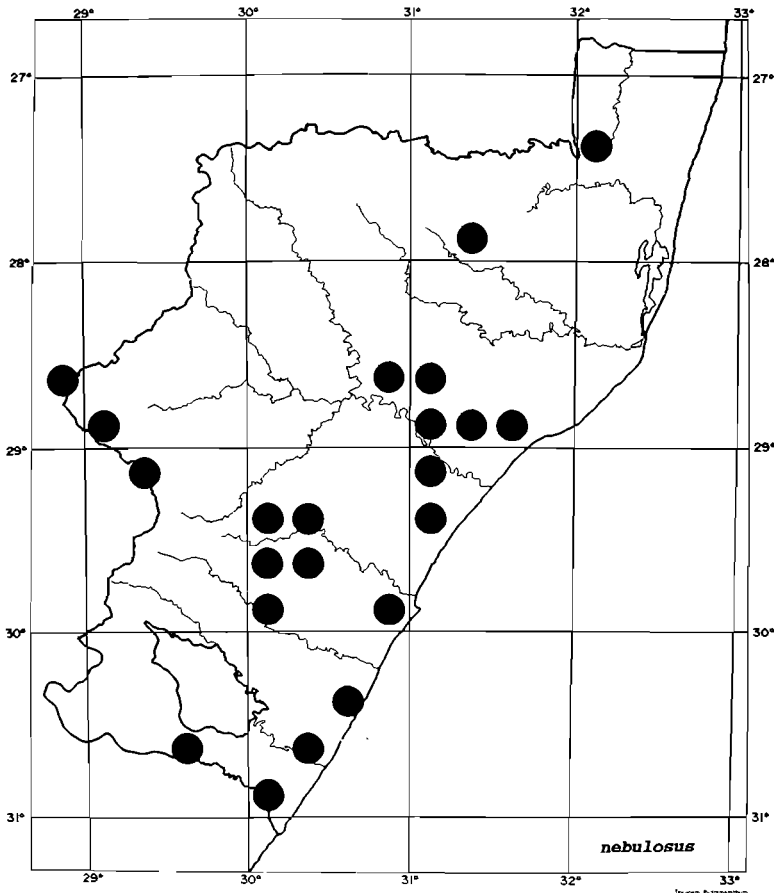


Fig. 7. *Bittacus nebulosus* Klug, 1838, distribution in KwaZulu-Natal.

*Bittacus peringueyi* Esben-Petersen, 1913

Synonyms: *Haplodictyus testaceus* Navás, 1913 ('South Africa').

Type locality: South Africa: Cape: King William's Town.

Recognition: A moderately large, broad-winged, yellowish species. Wings unmarked and with a single pterostigmal crossvein; legs lacking dark tipped femora; male epandrial lobes moderately elongate. Similar species: None. Superficially most like *B. bicornis*, *B. armatus*, *B. testaceus*.

Number of KwaZulu-Natal specimens studied: 66.

Afrotropical distribution: South Africa (Transvaal, KwaZulu-Natal, Orange Free State. Cape Province).

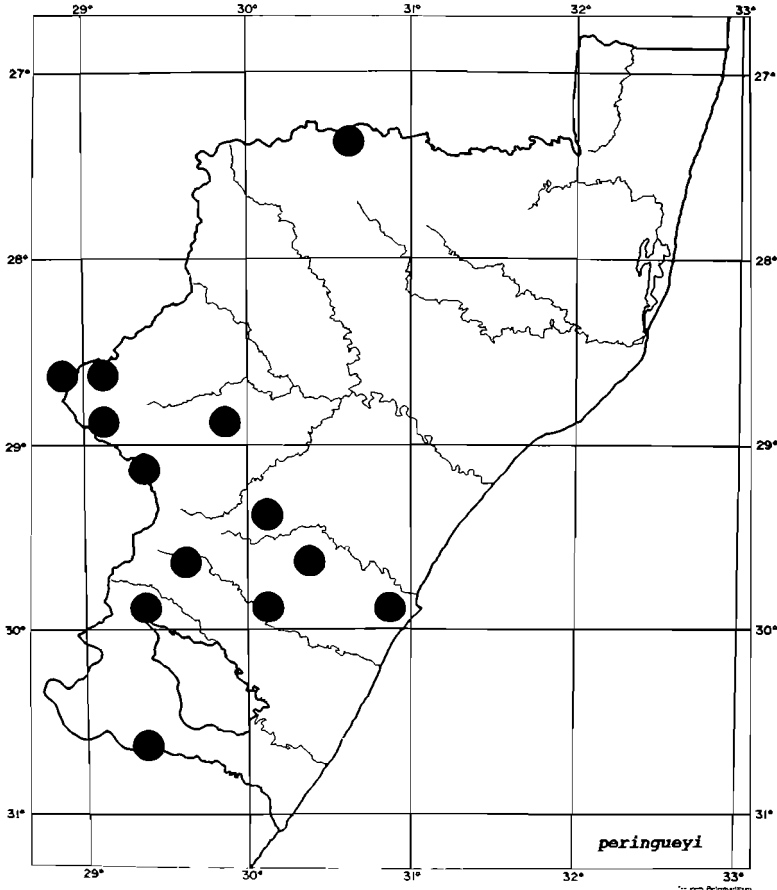


Fig. 8. *Bittacus peringueyi* Esben-Petersen, 1913, distribution in KwaZulu-Natal.

KwaZulu-Natal distribution (Fig. 8): Fairly widespread; known from all but the highest altitudes (Table 2), but apparently preferring higher lying places (600–1200 m).

Seasonal incidence of adults: Records for the species are from December through to July, thus indicating late summer activity.

Habitat: A large proportion of records pertain to specimens collected at light (approximately one-third of KwaZulu-Natal specimens carry such label information). Day collecting indicates that the species inhabits grass and scrub, sometimes adjacent to forest patches.

*Bittacus selysi* Esben-Petersen, 1917

Synonyms: None.

Type locality: South Africa: KwaZulu-Natal: Durban.

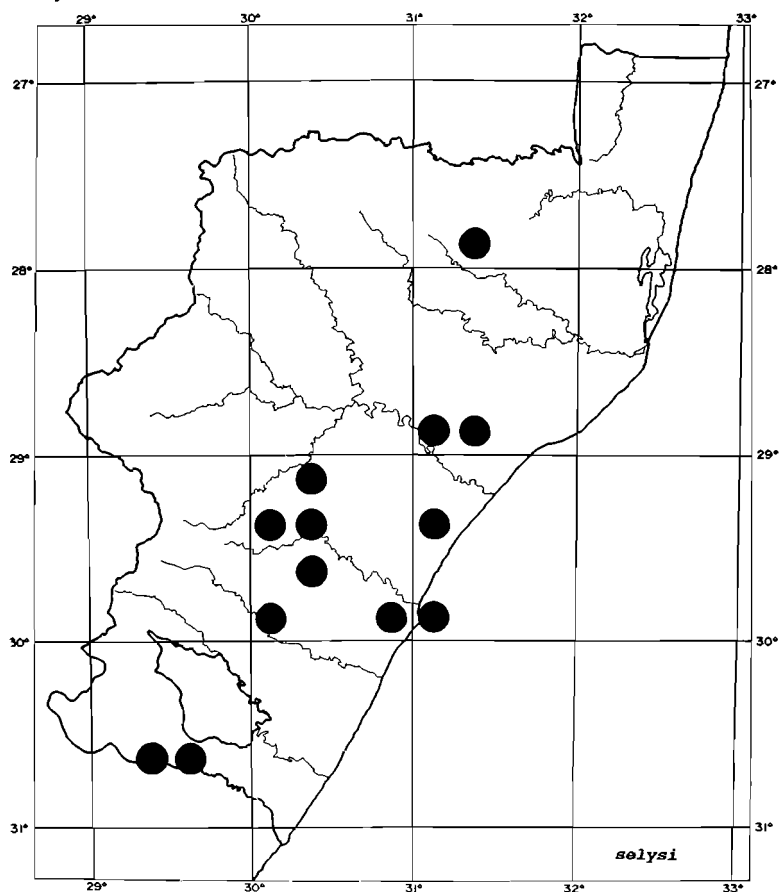


Fig. 9. *Bittacus selysi* Esben-Petersen, 1917, distribution in KwaZulu-Natal.

**Recognition:** A small, broad-winged, yellow and black species. Wing membranes marked; two pterostigmal crossveins; legs with dark tipped femora; male epandrial lobes short and pointed. Similar species: *B. sobrinus*, *B. zulu*.

**Number of KwaZulu-Natal specimens studied:** 109.

**Afrotropical distribution:** South Africa (KwaZulu-Natal); Transkei.

**KwaZulu-Natal distribution (Fig. 9):** Fairly wide-spread and common at altitudes between 300–900 m (Table 2).

**Seasonal incidence of adults:** KwaZulu-Natal records have been collected between October and February (an isolated record from July), indicating a mid-summer active species (Table 1).

**Habitat:** Apparently confined to low, broad-leafed vegetation of forest floors and margins. Often found together with *B. nebulosus*, but infrequently observed at levels above 1 m from the ground.

*Bittacus sobrinus* Tjeder, 1956

Synonyms: None.

Type locality: South Africa: KwaZulu-Natal: Underberg.

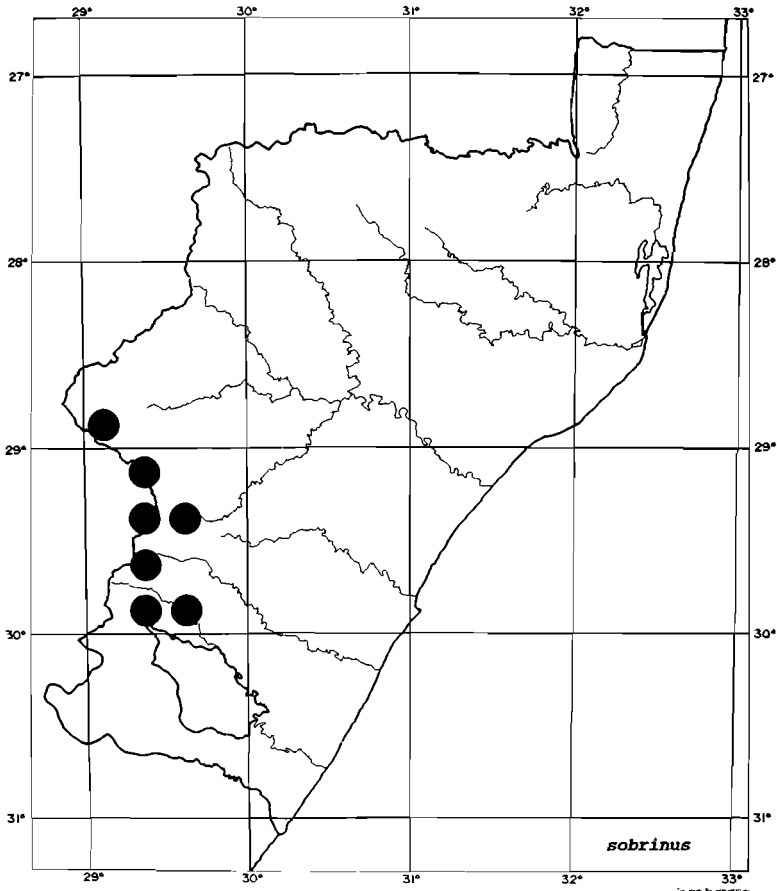


Fig. 10. *Bittacus sobrinus* Tjeder, 1956, distribution in KwaZulu-Natal.

**Recognition:** A small, broad-winged, yellowish species. Wings unmarked and with two pterostigmal crossveins; legs with dark tipped femora; male epandrial lobes short and pointed. Similar species: *B. selysi*, *B. zulu*.

**Number of KwaZulu-Natal specimens studied:** 36.

**Afrotropical distribution:** South Africa (KwaZulu-Natal).

**KwaZulu-Natal distribution (Fig. 10):** Restricted to high altitude localities (Table 2) in the Drakensberg mountains and foothills.

**Seasonal incidence of adults:** A mid-summer species, collected mainly between November and January (Table 1).

**Habitat:** Found in dense montane grassland (other plant types often being present), some localities are the steep sides of stream valleys.

*Bittacus testaceus* Klug, 1838

Synonyms: *Bittacus brincki* Tjeder, 1956 (South Africa: Transvaal: Louis Trichardt).

Type locality: South Africa: Cape: Grahamstown.

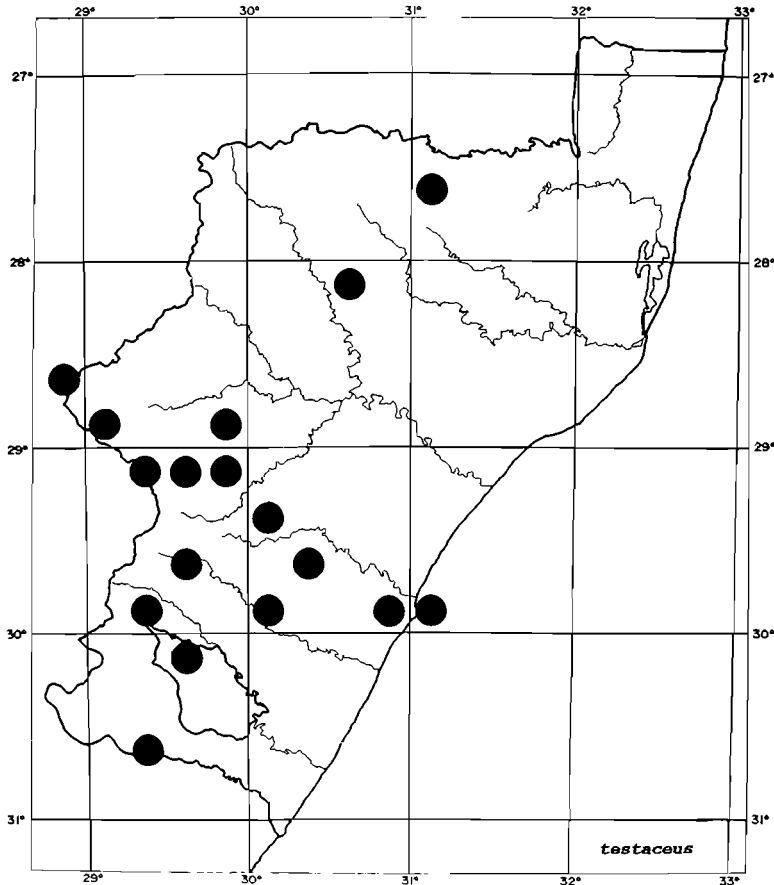


Fig. 11. *Bittacus testaceus* Klug, 1838, distribution in KwaZulu-Natal.

Recognition: A large, broad-winged, yellowish species. Wings unmarked and with two pterostigmal crossveins; legs lacking dark tipped femora; male epandrial lobes elongate. Similar species: *B. armatus*, *B. bicornis*.

Number of KwaZulu-Natal specimens studied: 33.

Afrotropical distribution: South Africa (Transvaal, KwaZulu-Natal, Orange Free State, Cape Province); Transkei; ? Zimbabwe.

KwaZulu-Natal distribution (Fig. 11): A widely distributed species; found at altitudes between the coast and 1200 m (Table 2) although more commonly encountered between 600–1200 m.

Seasonal incidence of adults: Southern African records are available for September through to April, although no KwaZulu-Natal records exist for October and April (Table 1). Adults are, therefore, active from early summer through to late summer.

Habitat: Found in long grass or mixed scrub vegetation such as occurs adjacent to forest patches or along fence-lines. A few specimens have been captured at light.

*Bittacus walkeri* Esben-Petersen, 1915

Synonyms: *Bittacus capensis* Walker, 1853 (misidentified);

*Bittacus angulosus* Tjeder, 1956 (South Africa: KwaZulu-Natal: Krantzkloof).

*Bittacus gessi* Londt, 1972 (Transkei: Bizana).

*Bittacus pondoensis* Londt, 1972 (Transkei 'Pondoland').

Type locality: South Africa: KwaZulu-Natal: Curry's Post.

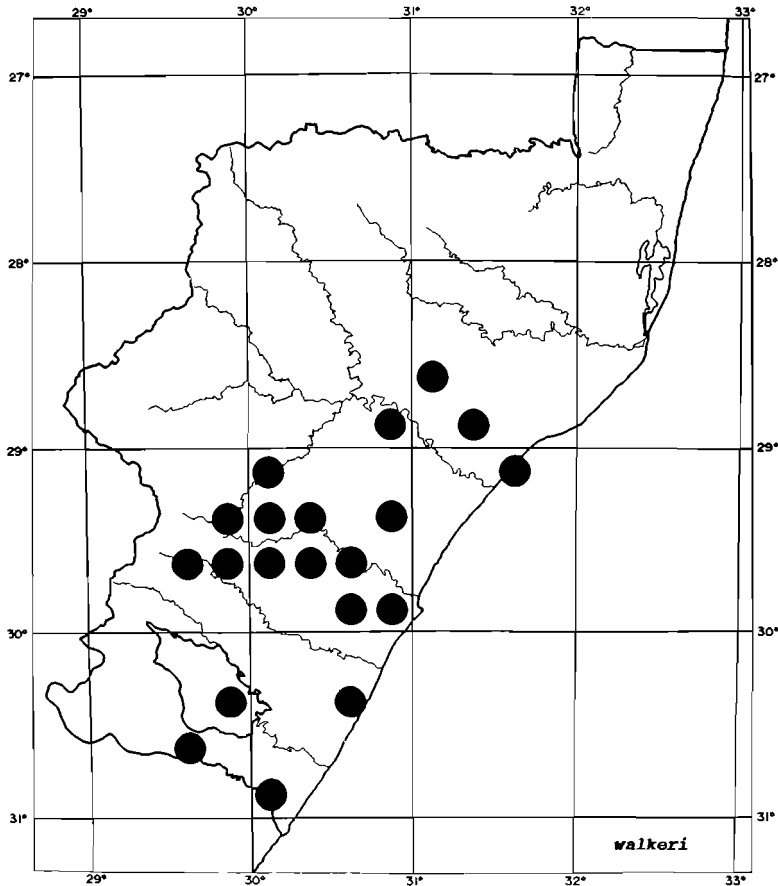


Fig. 12. *Bittacus walkeri* Esben-Petersen, 1915. distribution in KwaZulu-Natal.

Recognition: A large, narrow-winged, yellowish species. Wings unmarked and with two pterostigmal crossveins; legs with dark tipped femora; male epandrial lobes short. Similar species: *B. kimminsi*.

Number of KwaZulu-Natal specimens studied: 108.

Afrotropical distribution: South Africa (KwaZulu-Natal, Cape Province); Transkei.

KwaZulu-Natal distribution (Fig. 12): Fairly widespread in the southern half of

KwaZulu-Natal. Found from the coast to altitudes above 900 m, although most common between 300–900 m (Table 2).

Seasonal incidence of adults: A late summer species; records being available for all months between January and May (Table 1).

Habitat: A species of open grassland, often found within a short distance of indigenous forest patches.

*Bittacus zambezinus* Navás, 1931

Synonyms: *Bittacus natalensis* Wood, 1933 (South Africa: KwaZulu-Natal: Bulwer).

Type locality: Mozambique: Chupanga.

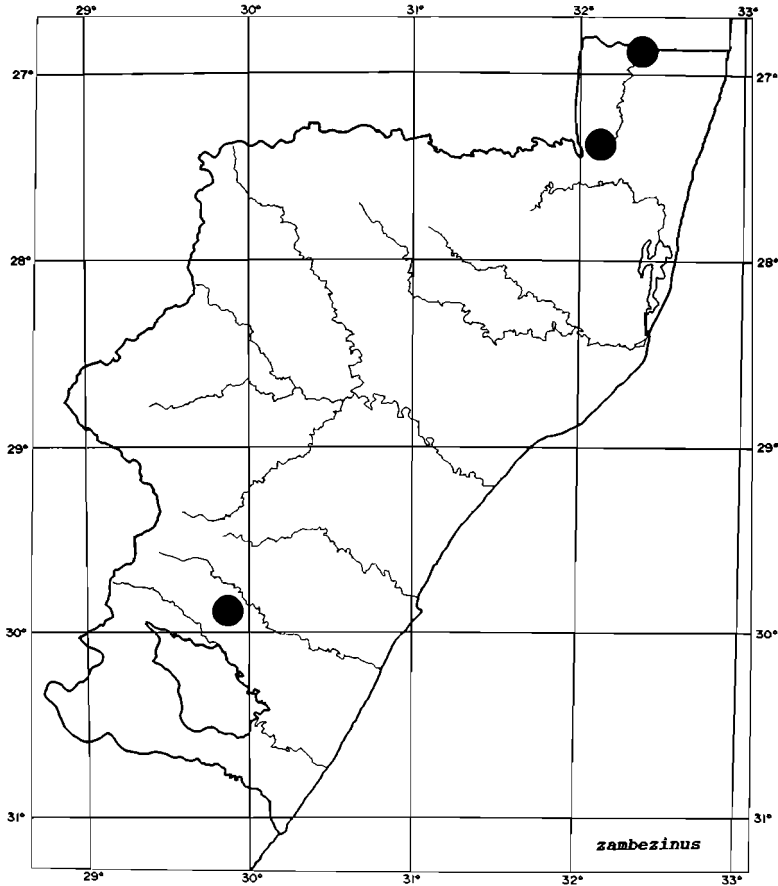


Fig. 13. *Bittacus zambezinus* Navás, 1931, distribution in KwaZulu-Natal.

Recognition: A small, broad-winged, yellowish species. Wings unmarked and with two pterostigmal crossveins; fore-legs with dark femora and tibiae; male with elongate club-shaped proctiger. Similar species: none.

Number of KwaZulu-Natal specimens studied: 21.

Afrotropical distribution: Botswana; Malawi, Mozambique, South Africa (Transvaal, KwaZulu-Natal); Zimbabwe.

KwaZulu-Natal distribution (Fig. 13): Known from a few widely separated localities which appear to have little in common.

Seasonal incidence of adults: Collected only from January to March in KwaZulu-Natal and throughout its wide range (Table 1).

Habitat: Little known. The species has been collected at light, and in flight traps in grassland and woodland (savannah) areas.

*Bittacus zulu* Londt, 1972

Synonyms: None.

Type locality: South Africa: KwaZulu-Natal: M'fongosi.

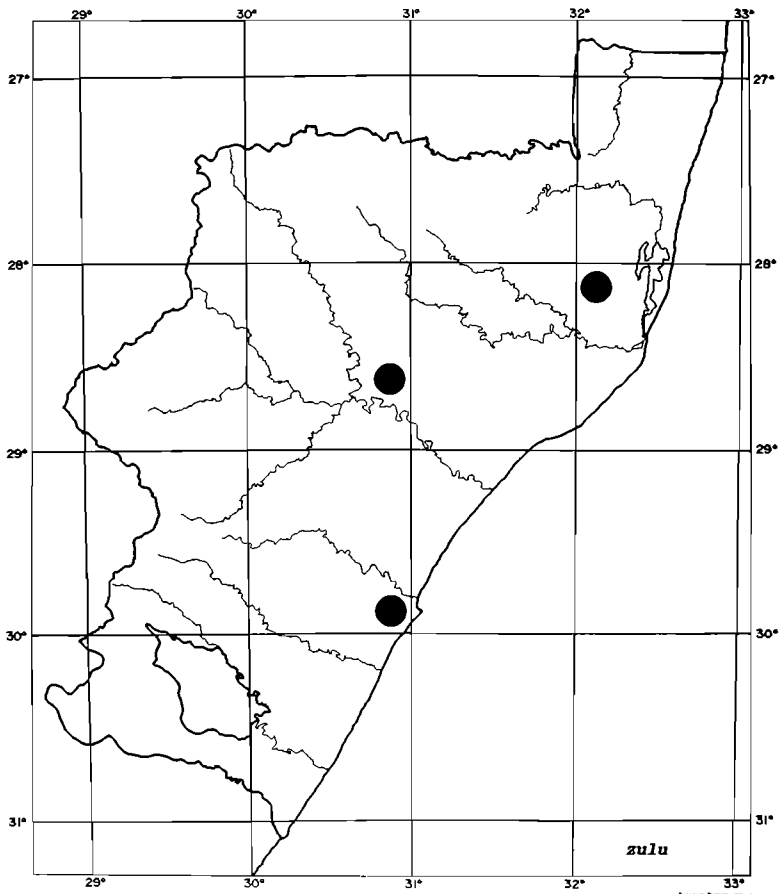


Fig. 14. *Bittacus zulu* Londt, 1972, distribution in KwaZulu-Natal.

Recognition: A moderately sized, broad-winged, yellowish species. Wing membranes weakly marked; two pterostigmal crossveins; legs with dark tipped femora; male epandrial lobes short and pointed. Similar species: *B. selysi*, *B. sobrinus*.

Number of KwaZulu-Natal specimens studied: 14.



Afrotropical distribution: South Africa (KwaZulu-Natal).

KwaZulu-Natal distribution (Fig. 14): Known only from a few widely separated localities in KwaZulu-Natal.

Seasonal incidence of adults: Apparently found from early through to late summer (Table 1) although no records are available for January, February or March.

Habitat: Collected only from medium height grass in the shade of *Acacia* trees.

## DISCUSSION

### Distribution

The distribution patterns demonstrated for most species are clearly limited by the overall coverage achieved by present collections (Fig. 15). *Bittacus* are recorded from 53 (30 %) of the 175 quarter-degree squares covering KwaZulu-Natal. Most of the available records are for localities in the southern half of the province, indicating a need to direct future collecting primarily in the northern parts.

Species may be arranged in three main groups as follows:

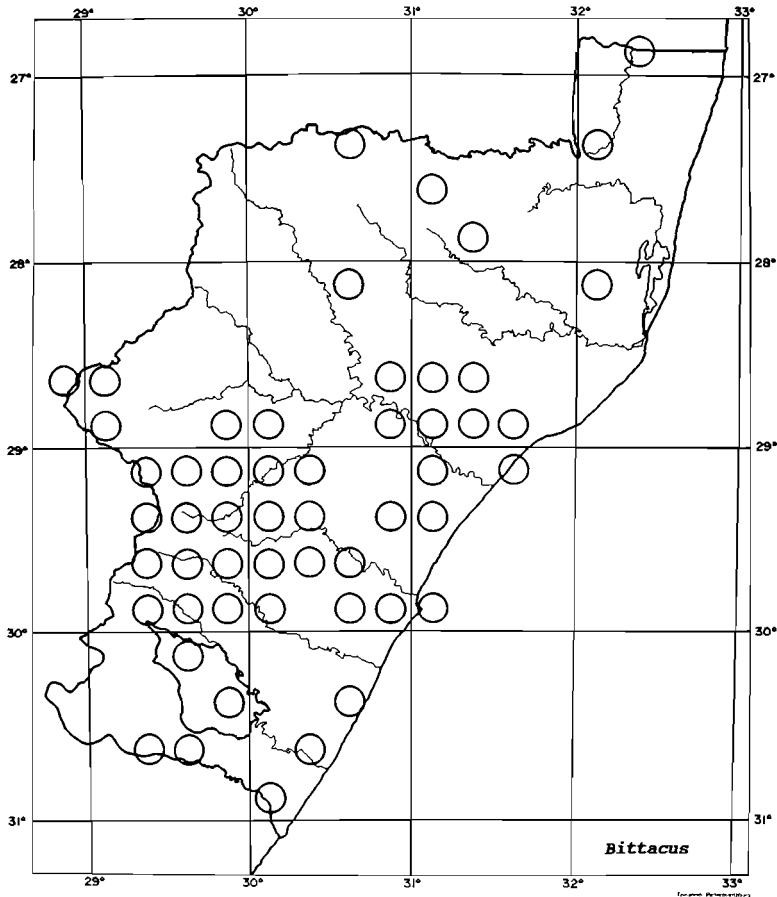


Fig. 15. *Bittacus* Latreille, 1805, distribution in KwaZulu-Natal based on all available data.

- i. Species which appear to have the centre of their range in KwaZulu-Natal (*bicornis*, *kimminsi*, *selysi*, *sobrinus*, *walkeri*, *zulu*);
- ii. Species which have the centre of their range further south (possibly *nebulosus*, *peringueyi* and *testaceus*);
- iii. Species which have the centre of their range further north (*armatus*, *zambezinus*).

Species may also be tabulated according to the altitudes at which they are known to occur (Table 2). Although the data are biased, as each of the five altitude ranges used is not equally represented, collecting data and experience suggests that some species occur mainly at higher elevations (eg. *peringueyi*, *kimminsi* and *sobrinus*) while others are more commonly encountered at lower elevations (e.g. *walkeri*, *nebulosus* and *selysi*).

Basic atlasing projects of the kind attempted here usually aim to achieve at least some of the following objectives:

1. To provide detailed, readily updatable, information concerning the distribution and seasonal incidence of species in the region surveyed.
2. To provide a base for future atlasing projects.
3. To stimulate interest in gaining more detailed information about species populations.
4. To provide a base for the accumulation of biological and ecological information.
5. To provide a realistic base for the assessment of future data requirements.
6. To provide a base for conservation considerations.
7. To draw attention to the value of museum-based collections.

TABLE 3

KwaZulu-Natal sanctuaries from which *Bittacus* species are recorded. Names as in Stuart & Stuart (1992) and Cooper (1985). [Abbreviations: FR = Forest Reserve; GR = Game Reserve; NR = Nature Reserve.]

Species	Sanctuary/Reserve
<i>armatus</i>	Weenen NR
<i>bicornis</i>	Mdedelelo Wilderness Area (Monk's Cowl area)
<i>kimminsi</i>	Ferncliffe Forest; Giant's Castle GR; Loteni NR; Mdedelelo Wilderness Area (Cathkin Park area); Mlambonya Wilderness Area (Cathedral Peak area); Mzimkulwana NR (Garden Castle FR); Royal Natal National Park
<i>nebulosus</i>	Dlinza Forest NR; Ferncliffe NR; Giant's Castle GR; Gwaliweni Forest; Mdedelelo Wilderness Area (Champagne Castle & Monk's Cowl areas); Mlambonya Wilderness Area (Cathedral Peak area); Ngome Forest; Ngoye Forest; Nkandhla Forest; Qudeni Forest; Umtamvuna NR; Ingeli Forest (Weza area)
<i>peringueyi</i>	Giant's Castle GR; Krantzkloof & Nqutu Falls NR; Mlambonya Wilderness Area (Cathedral Peak area); Mzimkulwana NR (Garden Castle FR); Pongola Bush NR; Royal Natal National Park (& Mont-Aux-Sources)
<i>selysi</i>	Entumeni NR; Ferncliffe Forest; Ngome Forest; Nkandhla Forest; Ingeli Forest (Weza area)
<i>sobrinus</i>	Bulwer Mountain NR; Kamberg NR; Mlambonya Wilderness Area (Cathedral Peak area); Mdedelelo Wilderness Area (Champagne Castle area); Mzimkulwana NR (Garden Castle FR & Sani Pass areas)
<i>testaceus</i>	Coleford NR; Giant's Castle GR (Injasuti area); Itsikeni Forest; Itala GR; Loteni NR; Mlambonya Wilderness Area (Cathedral Peak area); Royal Natal National Park
<i>walkeri</i>	Doreen Clark NR; Entumeni NR; Ferncliffe Forest; Karkloof NR (Rockwood); Krantzkloof & Nqutu Falls NR; Nkandhla Forest; Umgeni Valley NR; Umtamvuna NR; Vernon Crooks NR; Ingeli Forest (Weza area)
<i>zambezinus</i>	Ndumu GR
<i>zulu</i>	Hluhluwe GR; Krantzkloof & Nqutu Falls NR

Most of these objectives have been met in this project. It is clear that what has been presented is an 'historical perspective'. As many of the records are old, a 'present status' survey needs to be undertaken in order to establish whether species are still to be found where originally collected.

It is hoped that this contribution may stimulate further interest in the *Bittacus* species of KwaZulu-Natal, and elsewhere, as there is still much to learn about the status of their populations. These populations may indeed be under considerable threat, what with the current afforestation of large tracts of primary grassland, especially in the KwaZulu-Natal midlands, and the degradation or destruction of indigenous forests throughout the province (Cooper 1985).

While it may be argued that *Bittacus* populations in KwaZulu-Natal are under threat, many of the species have been recorded from areas under the management of a variety of conservation agencies (Table 3).

Almost nothing is known of the immature stages of any southern African *Bittacus* or of their specific requirements for successful breeding. The little that is known of adult behaviour suggests that *Bittacus* species are polyphagous predators of other insects. As such they could prove to be useful 'indicators' of biodiversity, their presence at the apex of insect trophic levels indicating an abundance of other, smaller, mostly herbivorous insects.

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